

# Fiber-Based Adsorbents Tailored for PLSS Ammonia and Formaldehyde Removal, Phase II

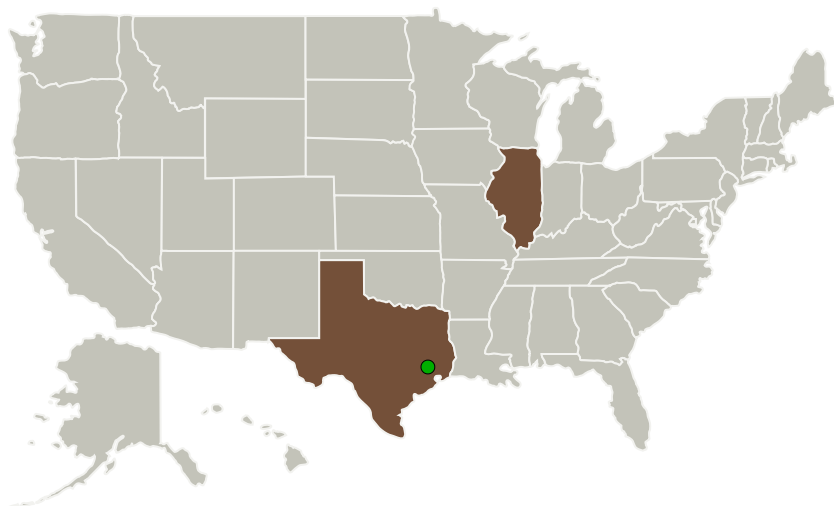
Completed Technology Project (2017 - 2020)



## Project Introduction

Development of advanced lightweight Trace Contaminant Control (TCC) filters plays an important role in removing ammonia and formaldehyde contaminants both those produced by crew metabolism and material/equipment off-gassing into the space suit system for future space and planetary systems. Serionix Inc. has developed proprietary adsorptive coatings which can be applied on porous and nonporous substrates to yield functional composite media capable of rapid, efficient adsorption of trace ammonia and formaldehyde. In Phase I, research was conducted which demonstrated technical feasibility and excellent performance capacity of Serionix single-pass and regenerable adsorbents for targeted components under simulated PLSS operating environment. During phase II, we will tailor our sorbents and design a prototype directly compatible with PLSS requirements, for filter assembly which can be incorporated into a TCC system or synergistically integrated with the existing RCA unit. In addition, we will perform extensive robustness testing to evaluate media under operational and hazard scenario conditions. Successful implementation of our technology will increase efficiency while reducing mass, volume, and pressure drop of the TCC system to protect the crew in all mission environments and address a wide range of current and future NASA requirements.

## Primary U.S. Work Locations and Key Partners



Serionix media vs. Ammonasorb II

50 ppm NH<sub>3</sub>, 20 fpm

Sample	Humidity	Capacity (mg/g) @ C/C <sub>0</sub> =0.5
Benchmark	0%	4.6
Ammonasorb II®	50%	19.2
Serionix media	0%	23.6
	50%	98.3

Flexible formats

Flat sheet   Spiral   Pleated   Coated Monolith

Flow uniformity visualization mapping

Chemisorption media

Flow

Color-changing feature allows visualization of flow across TCC manifold mockup.

Fiber-Based Adsorbents Tailored for PLSS Ammonia and Formaldehyde Removal, Phase II Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Serionix	Lead Organization	Industry	Champaign, Illinois
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

## Primary U.S. Work Locations

Illinois	Texas
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## Project Transitions

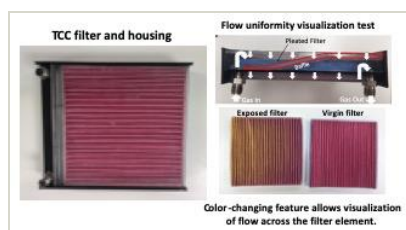
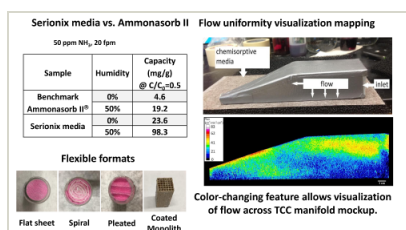
▶ **April 2017:** Project Start

✓ **July 2020:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140981>)

## Images



## Briefing Chart Image

Fiber-Based Adsorbents Tailored for PLSS Ammonia and Formaldehyde Removal, Phase II Briefing Chart Image (<https://techport.nasa.gov/image/136928>)

## Final Summary Chart Image

Fiber-Based Adsorbents Tailored for PLSS Ammonia and Formaldehyde Removal, Phase II (<https://techport.nasa.gov/image/126526>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Serionix

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

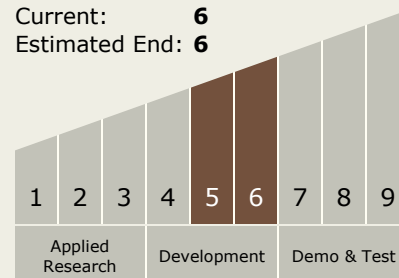
Carlos Torrez

## Principal Investigator:

James Langer

## Technology Maturity (TRL)

Start: 5  
Current: 6  
Estimated End: 6



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## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.2 Extravehicular Activity Systems
    - └ TX06.2.2 Portable Life Support System

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System